

Journal of the Royal Society of Arts

NO. 4952

FRIDAY, 27TH MAY, 1955

VOL. CIII

FORTHCOMING MEETINGS

WEDNESDAY, 8TH JUNE, at 2.30 p.m. *'The Art of the Modern Medal'*, by C. H. V. Sutherland, M.A., D.Litt., Deputy Keeper of Coins, Ashmolean Museum, Oxford. Professor A. E. Richardson, President, Royal Academy of Arts, and Member of Council of the Society, will preside, and afterwards open the 'Exhibition of European Medals, 1930-1955'. (The paper will be illustrated with lantern slides. Tea will be served afterwards.)

TUESDAY, 28TH JUNE, at 2.30 p.m. *'The Medal in Art and Society'*, by Jean Babelon, Conservateur-en-Chef du Cabinet des Médailles, Bibliothèque Nationale, Paris. Professor Michael Grant, O.B.E., M.A., President, Royal Numismatic Society, will preside. (The paper will be illustrated with lantern slides. Tea will be served afterwards.)

Fellows are entitled to attend any of the above meetings without tickets and may also bring two guests. When they cannot accompany their guests, Fellows may give them special passes, books of which can be obtained on application to the Secretary.

EXHIBITION OF EUROPEAN MEDALS, 1930-1955

As was announced in the last issue of the *Journal*, an 'Exhibition of European Medals, 1930-1955' will be held in the Library from the 8th to the 29th June. The Exhibition will be open on weekdays, including Saturdays, from 10 a.m. to 5.30 p.m. (Wednesdays to 7 p.m.).

The Deputy Master of the Royal Mint has kindly offered to make special arrangements to show any visitors to the Exhibition who may be interested over the Royal Mint. Special parties will be formed for this purpose at 10.30 a.m. and 2.30 p.m. on Thursdays, 9th and 16th June. Fellows who wish to join these should apply for tickets (not more than two) to the Secretary as soon as possible.

- THE SOCIETY'S CHRISTMAS CARD, 1955



Primarily with the object of giving as early notice as possible to overseas Fellows, this preliminary announcement is being made of the Society's intention again to produce a special full-coloured Christmas card this year.

The card, here illustrated in black and white, reproduces in colour the first known Christmas card to be published in this country. It appeared in 1843 and was designed by J. C. Horsley, R.A., at the suggestion of Henry Cole. Cole was very closely connected with the Society, being Chairman of Council in 1850 and again in 1852. For present purposes the original card has been embellished with a border selected from contemporary motifs by Mr. John Brinkly.

It is unfortunately not yet possible to give prices for the card, but these will be announced as soon as they are available. In the meantime, it can be stated that they will be no higher than last year; that is, 12s. per dozen for *overseas Fellows*, and those of them who would like to place orders now may do so and send their remittances later. Overprinting of the name and address can be undertaken at an extra charge.

It is expected that the cards will be ready for despatch by the end of September.

INDUSTRIAL ART BURSARIES COMPETITION

PUBLICATION OF 1954 REPORT AND PARTICULARS FOR 1955

The Report on the 1954 Industrial Art Bursaries Competition has now been published, together with the particulars of the further Competition to be held in 1955, and copies may be obtained from the Deputy Secretary without charge.

In addition to the list of awards, which was published in the *Journal* on the 4th March last, the Report also contains particulars of the Tests set in each section, the reports and compositions of the Juries, and a summary of the uses made of Bursaries in 1954 by previous Bursary winners. Illustrations of most of the winning designs, a number of which were reproduced in the *Journal* on the 4th March last, are also included in the Report.

Details of the Competition to be held in 1955 are included in the second part of the publication. Except where otherwise stated, one Bursary of £150 will be offered in each of the following Competition Sections:

DOMESTIC ELECTRICAL APPLIANCES	WOMEN'S FASHION WEAR (TWO BIANCA
ELECTRIC LIGHT FITTINGS	MOSCA AWARDS OF £200 AND £150
DOMESTIC GAS APPLIANCES	RESPECTIVELY)
DOMESTIC SOLID-FUEL-BURNING	ACRYLIC SHEET ('PERSPEX')
APPLIANCES	LAMINATED PLASTICS
CARPETS	P.V.C. PLASTICS SHEETING
DRESS TEXTILES (TWO BURSARIES	FOOTWEAR
OF £150 EACH)	FURNITURE
FURNISHING TEXTILES	JEWELLERY
	WALL-PAPER

In addition to the above Bursaries the Council of the Society may provide supplementary awards from the Art Congress Studentship Trust Fund and from the Owen Jones Memorial Trust Fund.

Candidates under 21 and above 18 years of age who are awarded a Bursary in this competition will be offered Associate Membership of the Society without subscription until they reach the age of 25; then, if they so desire, they may transfer to full Fellowship on payment of the normal subscription. Bursary winners who are under 18 qualify for Associate Membership as soon as they reach that age.

The Sir Frank Warner Memorial Medal will be awarded to the candidate submitting the best design in the Set Test in either the Furnishing Textiles, Dress Textiles, or Carpet section of the competition, if of sufficient merit. This Medal may be awarded to a successful candidate in addition to a Bursary.

The last day for the receipt of entry forms is the 10th October, 1955.

VIRUS DISEASES OF PLANTS

The Fernhurst Lecture by

F. C. BAWDEN, M.A., F.R.S.,

Deputy Director and Head of the Plant Pathology Department, Rothamsted Experimental Station, delivered to the Society on Wednesday, 23rd February, 1955, with Sir James Scott Watson, C.B.E., M.C., LL.D., D.Sc., lately Chief Scientific and Agricultural Adviser, Ministry of Agriculture, in the Chair

THE CHAIRMAN: It is a rather commonly held view that the number of ills that flesh is heir to is steadily increasing, and that applies not only to the human kind, but to our domesticated animals and the plants we grow, whether for food or other purposes. Indeed that notion has been so widely held that people are seeking for a general explanation for what they assume to be a fact.

In regard to the subject for this afternoon, it was, of course, long assumed that the cause of the so-called degenerative diseases was vegetative reproduction. Just as the animal population would degenerate if you inbred it, so a plant that was propagated vegetatively missed the stimulus of exogamy and so degenerated. But if we go further back, we find that many of the ills with which we are familiar to-day were very well known to people long ago. I once had the curiosity to look through some old county reports on the potato crop, and I found that everywhere there were remarks about a trouble that was known as 'the curl'. Some of the reports said that it had something to do with degeneration. Some were much wiser, pointing out that many strains of potatoes would keep healthy if grown at high elevations in windy parts of the country, whereas they deteriorated very fast if they were brought down to the lowland. That was 150 years ago, and only now are we gaining understanding of problems that have long been recognized, and are using this understanding in seeking solutions.

Nobody is more distinguished in this field of virus disease than our lecturer this afternoon, and he has some exciting things to say. Most particularly I think it has been the general assumption that once you have got a stock of blackcurrants or potatoes infected with a virus, that is that, and that you have to search the world, if necessary, for a healthy blackcurrant or a healthy potato. Sometimes the search has been extremely difficult. I think it may be said that Dr. Salaman combed Ireland without finding a King Edward potato that was absolutely free from any form of virus. Now there is this very exciting possibility of curing the infected plant, and as a practical agriculturist that is something which excites me very much.

The following lecture, which was illustrated with lantern slides, was then delivered:

THE LECTURE

My invitation to give the Fernhurst Lecture for 1955 suggested as a subject 'Virus Diseases of Plants', but the time is now long past when this subject could be reviewed in fifty minutes. When, in 1945, I was also honoured with an

invitation to speak to the Royal Society of Arts on this subject, I was allowed three lectures, which occupied most of the *Journal* for February, 1946. In considering what to say to-day, I first thought that perhaps the most useful thing I could do would be to bring those lectures up to date by summarizing the main advances of the last ten years. I soon abandoned the idea, however, for too much has been done and I should produce only a tedious list of seemingly unrelated discoveries. I was forced then to select and, as this lecture is endowed by Plant Protection Limited, the most appropriate choice seemed to be the advances in controlling virus diseases.

When discussing control measures in 1945, I could do little except to describe the possibilities of breeding resistant varieties and the benefits from destroying infected plants, and to outline the health certification schemes for vegetatively propagated crops. Particularly I could point to the success achieved in raising vigorous stocks of potatoes in the north and west of Britain, where the aphid *Myzus persicae* is relatively scarce and inactive and where removing infected plants can not only maintain the health of a stock but even improve it. Of insecticides, the best I could report was that 'little success has so far attended their use', and then sugar the pill a little by adding that 'the testing of insecticides is only yet in its infancy and the future may be brighter than past results indicate'. I did not mention the fact that some infected plants could be cured or that substances were known that inhibit infections by viruses. I now regret this, for it showed a sad lack of foresight, though I can soften the blow to my self-esteem by knowing that I had many other things to describe and that the potential value of those facts was then far from evident. To-day, partly to compensate for my past omissions and partly to show the advances in our subject, I propose to devote my whole talk to discussing therapy and prophylaxis.

HEAT THERAPY

Plants lack the antibody-forming mechanisms of animals, and once a plant becomes systemically infected with a virus it usually remains so for the rest of its life; even worse, offspring produced vegetatively from infected plants are also infected. The first suggestion that permanent infection, although customary, need not necessarily be accepted as inevitable came thirty years ago, when Wilbrink and Houtman showed that immersing sugar-cane cuttings in hot water could free them from sereh and chlorotic streak, two suspected virus diseases. Kunkel established the point unequivocally in 1935 by showing that peach trees were cured from yellows if they were kept for 14 days or more at 35°C. He later showed that peach trees could be freed from some but not all of their other viruses by this treatment or by immersing dormant twigs for short periods in hot water. Later, moving to other plants, he found that keeping *Vinca rosea* and *Nicotiana rustica* at 40°C. freed them from some viruses that cause yellows-type diseases, and that small potato tubers were freed from witches' broom virus after six days at 36°C.

Kunkel's pioneering did not lead immediately to any extensive testing of heat therapy, perhaps because nothing was known about the properties of the viruses

he used, so that the cures could be explained by postulating that the viruses were all exceptionally susceptible to inactivation by heat. Interest in the possibilities of heat therapy was hardly aroused in Britain until 1949 when Kassanis showed at Rothamsted that potato tubers could be freed from the leaf roll virus by keeping them for ten days or more at 37°C . But this is also a virus that has not been transmitted mechanically and whose resistance to heat *in vitro* is unknown, so that it could again be assumed to become inactive at unusually low temperatures. Only when work was done to see how varying the temperatures at which plants are grown affects their susceptibility to viruses, did it become obvious that heat therapy might also be applicable to plants infected with viruses that have high thermal inactivation points.

The ease with which plants contract infection, the extent to which viruses multiply in them, and the symptoms they show, depend greatly on their physiological condition, and hence on the conditions in which they are growing. Each or all of these three features are affected by differences in manuring, watering, light intensity or temperature, but the variable producing the largest effects is temperature. Treatments that make plants more liable to become infected are not those that also necessarily increase the extent to which viruses multiply or the severity of symptoms they cause. Indeed, with variations in temperature, the opposite is more generally true. Keeping plants at high temperatures much increases their susceptibility to infection, so that a given inoculum may give ten times as many local lesions in leaves of plants that have been kept for two days at 36°C before inoculation as in those kept at about 20°C . This effect has been found with all the viruses yet tested. By contrast, keeping plants at 36°C after they are inoculated, usually decreases the number of lesions produced, but the order of this effect differs greatly with individual viruses. Some produce almost as many lesions in plants at 36°C as at 20°C , whereas others give few or none. The ability of a virus to multiply and produce lesions in leaves at 36°C is not correlated with its resistance to heat, at least not as this is customarily measured *in vitro* by finding the temperature at which infectivity is lost after ten minutes. Two of the viruses listed in Table I that have unusually high thermal inactivation points fail to form lesions at 36°C , whereas tomato spotted wilt virus, which has the lowest known thermal inactivation point, does.

If inability to cause lesions in plants at 36°C does not depend on a low thermal inactivation point, can it be correlated with any other kind of behaviour? Too few viruses have yet been studied for assured generalizations, but there is a suggestion that it is correlated with a small temperature coefficient of thermal inactivation (Q_{10}). By their behaviour when heated *in vitro*, viruses can be divided into two kinds, as they can also by their shapes and chemical constitutions. Viruses with elongated particles contain about six per cent ribose nucleic acid and these have a large Q_{10} ; their loss of infectivity when heated is correlated with their denaturation and they are inactivated only when heated near their thermal inactivation points. Spherical viruses, which contain three or more times as much nucleic acid, have a small Q_{10} , and they readily lose infectivity at temperatures much below their thermal inactivation points. Of the viruses whose

shape and chemical constitution are known, the elongated ones have caused lesions in plants at 36°C and the spherical ones have not.

TABLE I. EFFECT ON MEAN NUMBER OF LOCAL LESIONS OF KEEPING PLANTS AT 36°C BEFORE OR AFTER INOCULATION WITH VARIOUS VIRUSES

Virus and host	Plants at 36°C Before inoculation for			Plants at 36°C After inoculation for		
	0	1 day	2 days	0	1 day	2 days
Rothamsted tobacco necrosis (90)* in bean ...	2	29	46	69	0	0
Tomato bushy stunt (80) in <i>N. glutinosa</i> ...	18	83	97	65	9	2
Cucumber mosaic (60-70) in tobacco ...	15	45	78	144	0	0
Tobacco mosaic (93) in <i>N. glutinosa</i> ...	32	98	111	25	18	19
Tomato spotted wilt (45) in tobacco ...	86	197	165	173	121	96

Conditions in cells differ so much from those in leaf extracts that there is no *a priori* reason to expect a connection between the ability of a virus to maintain itself in plants at high temperatures and its behaviour when heated *in vitro*. Altering the temperature at which plants are grown can be expected to alter their metabolism and could alter the relative activities of systems needed for virus synthesis and systems that destroy virus particles. Certainly it is easy to show that varying temperature greatly affects the rate at which viruses accumulate in newly inoculated leaves. Table II shows that increasing temperature up to 22°C greatly increases the rate at which a tobacco necrosis virus accumulates, but with increases above 22°C the rate falls strikingly. From this kind of study, it is impossible to decide whether the virus fails to accumulate at the higher temperatures because it multiplies more slowly or because it is being broken down more rapidly. Other experiments, however, suggest that the high temperatures encourage host systems that break down the virus particles. For example, when plants that have become systemically infected with tomato bushy stunt

* Figures in brackets are the temperatures at which the viruses become inactivated in ten minutes *in vitro*.

TABLE II. THE EFFECT OF TEMPERATURE ON THE RELATIVE CONTENT OF ROTHAMSTED TOBACCO NECROSIS VIRUS IN INOCULATED FRENCH BEAN LEAVES

Temperature (°C)	Relative virus content at time after inoculation		
	23 hours	47 hours	71 hours
10	1	3	37
14	2	422	3,935
18	31	3,875	33,750
22	208	19,100	158,000
26	79	3,015	7,550
30	6	97	163

virus at 20°C are placed at 36°C, the infectivity of leaf extracts soon falls. At first this fall is not accompanied by a comparable fall in the amount of protein serologically related to the virus, suggesting that an early change leads to loss of infectivity without disrupting the virus particles, a type of change readily produced *in vitro* with this kind of virus, which has a small Q_{10} of thermal inactivation. Later the specific antigen also decreases, and after about three weeks no virus is usually detectable either by serological or infectivity assays. Such plants are not always virus-free; when returned to 20°C, many develop systemic symptoms again after a few weeks, presumably because virus survived in a few cells, perhaps in the main root or stem. If cuttings are struck from pieces of these plants at the end of their sojourn at 36°C, however, some usually develop into virus-free plants. Exposure to 36°C also decreases the virus content of plants systemically infected with either potato virus 'x' or tobacco mosaic virus, but too little to offer hope of the method yielding virus-free progeny. Failure with these, however, does not necessarily mean failure with all viruses that have a large Q_{10} of thermal inactivation, for these two are unusually stable and also occur in infected plants in unusually large amounts. With less stable ones that occur in smaller amounts, particularly in host plants that produce new shoots at 36°C, cuttings from these new shoots may yield virus-free plants, for viruses that can maintain themselves at high temperatures seem not to move freely into new tissues.

Whatever the explanation of heat therapy, its wide application has already been shown by freeing many different kinds of plants from some of their common viruses. Its practical value in giving healthy clones of varieties now universally virus-infected is too obvious to need stressing, and its main use probably lies in producing small 'nuclear' stocks for specialist propagators. However, when immersion in hot water will cure, a wider use becomes possible, and ratoon stunting of sugar cane is now controlled in Australia by a routine hot-water treatment. It seems too that, quite unbeknown, heat has long been operating

therapeutically for the potato crop in the plains of India. Two potato varieties are mainly grown there; one, Darjeeling Round Red, of which new supplies of 'seed' are brought regularly from the hills because the tubers do not survive the summer in the plains, and the other, Phulwa, maintained locally. Leaf roll is frequent in crops of Darjeeling Round Red, but not in Phulwa. At least it is rare unless 'seed' has been kept in the modern setting of a cool store, when it becomes frequent. Work at the Potato Research Institute, Patna, suggests that Phulwa has maintained its vigour, not because it is intrinsically resistant to leaf roll, but because its small tubers survive high temperatures, and tubers taken from plants that become infected while growing in the winter lose the virus while stored through the hot summer.

ULTRAVIOLET RADIATION

The fact that high temperatures can free plants from viruses does more than provide a method of curing some infected plants. It shows that, without permanently damaging plants, their metabolism can be so altered that they no longer support the multiplication of viruses to which they are normally hosts. This immediately suggests the possibility of similarly altering the metabolism by other means, for if the reactions of plants to high temperatures prohibit virus multiplication why not reactions to other physical or chemical stimuli? And I think there is already evidence that it can be done: unfortunately none of the things I shall mention promises to be an effective therapeutant, but they supply pointers to the future and some may function as prophylactics.

Ultraviolet radiation provides the best evidence for a stimulus working in this manner. When leaves are exposed to appropriate doses, they immediately resist infection by mechanically-transmitted viruses to which they would otherwise be susceptible. The resistance is temporary if the leaves are kept in visible light after irradiation, but permanent if they are not. The permanent effect need not concern us greatly; it happens because the epidermis of irradiated leaves dies if kept dark, a fact serving to show that irradiation profoundly affects the epidermis, which would not otherwise be immediately obvious as leaves kept in the light for a few hours after irradiation show no external signs of damage. During the period when visible light counteracts the effects of ultraviolet, some light-sensitive mechanism in the cells is presumably mobilized to replenish or restore some components, perhaps nucleic acids or nucleoproteins, that were damaged by the radiation. Diverting the cell metabolism to do this seems not only to prohibit virus multiplication but also to destroy virus particles in the cells, for particles introduced during this period do not remain dormant and able to cause lesions later when the cells regain their susceptibility to infection. To get lesions then, the leaves must be inoculated with more virus.

Viruses can be inactivated in the epidermal cells of systemically infected plants by irradiating them with ultraviolet, but the technique has no therapeutic value, because the radiation has little penetrating power and cannot free deep-seated tissues. Viruses can be inactivated by many other kinds of radiations and some that penetrate deeply may have therapeutic value, but the problem has not

been studied and there is no evidence to show whether viruses could be inactivated *in vivo* without also permanently damaging the host plant.

INHIBITORS OF INFECTION

The effect of ultraviolet in temporarily enhancing the resistance of leaves to infection can safely be attributed to changes in the host-plant metabolism, because the virus particles are never exposed to the stimulus. There is no such easy conclusion about the action of substances that inhibit infection, both virus and host are exposed to them and effects on one or the other cannot be separated. Many substances do inhibit infection, and they are very varied chemically, ranging from proteins and polysaccharides, through polypeptides, to purine and pyrimidine analogues and some other small molecules. Inhibitors of viruses are common components of organisms; they occur in leaves of many plants, of which the most studied are *Phytolacca* sp., beet, carnation and sweet william, in many fungi, in fruit juices, milk and blood. Their action has been studied chiefly by mixing them with mechanically-transmissible viruses *in vitro* and comparing the infectivity of the mixtures with comparably diluted virus on its own. Some of the most studied, for instance, the enzymes ribonuclease and trypsin, and a glycoprotein from *Phytolacca* sp., combine with virus particles *in vitro*. This provides a conveniently simple explanation for their action, for it can be postulated that, in combining, they block some group on the virus particles that needs to be free if the particles are to infect. The inhibitors do not permanently inactivate the viruses, and when they are removed from a mixture the virus is left with its original infectivity. The combination may well be incidental to rather than a cause of inhibition. There is no fixed ratio of virus to inhibitor that neutralizes infectivity; the fact that, proportionately, a dilute virus preparation needs much more inhibitor to neutralize infectivity than a concentrated one, suggests an effect on the host plant rather than an interaction with the virus. Also, the extent to which infection is prevented depends largely on the species of the host plant inoculated rather than on the identity of the virus in the inoculum.

In interpreting their mode of action, it is worth noting that the inhibitors from leaves of plants have little effect in preventing infection of the species that contain them; sap from carnation leaves, for example, does not prevent carnation ringspot virus from infecting carnations, but does prevent it from infecting tobacco or French bean. Then, the fungus, *Trichothecium roseum*, produces two inhibitors, one a polysaccharide and the other, trichothecin, which is also an anti-fungal substance, has the molecular formula $C_{19}H_{24}O_3$, and is an ester of the ketonic alcohol, trichothecolone. Although they both behave in the same general manner as other inhibitors, their action cannot be attributed to blocking essential groups on virus particles, because neither combines with virus particles *in vitro*. They show different host specificities, for trichothecin inhibits infection of French bean more than of *Nicotiana glutinosa* and the polysaccharide inhibits infection of *N. glutinosa* more than of bean. Table III shows this and also how changing the constitution of a substance slightly can greatly

change its ability to inhibit infection in different kinds of plants, acetyltrichothecolone completely reversing the action of trichothecin and inhibiting infection of *N. glutinosa* strongly, but having no effect with French bean. Another striking illustration of the determining part played by the host is that, although infection of tobacco (*Nicotiana tabacum*) is little affected by the polysaccharide from *T. roseum*, that of a tobacco-like hybrid between *N. glutinosa* and *N. tabacum* is.

TABLE III. THE RELATIVE EFFECTS OF DIFFERENT SUBSTANCES IN INHIBITING INFECTION IN TWO HOSTS

Substance	Tobacco mosaic virus in <i>N. glutinosa</i>	Tobacco necrosis virus in French bean
Ribonuclease 0.01% ...	5	0.5
Polysaccharide from <i>T. roseum</i> 0.05% ...	1	13
Trichothecin 0.01% ...	48	25
Trichothecolone 0.01% ...	30	70
Acetyltrichothecolone 0.01% ...	2	90
Water control ...	100	100

Many inhibitors, for instance ribonuclease, *Phytolacca* glycoprotein, milk or sugar-beet sap, give no sign of injuring leaves even when applied at many times the concentration needed to inhibit infection by strong virus preparations. Neither does the polysaccharide from *T. roseum*, but trichothecin does and it injures French bean, in which it inhibits infection, much more than *N. glutinosa*. By contrast acetyltrichothecolone, and trichothecolone, both damage leaves of *N. glutinosa* but not of French bean, and these inhibit infection of *N. glutinosa* more than of French bean. These, and other phenomena that could be described, combine to suggest that the inhibitors function by affecting the host plants. What they do to the host cells is unknown, and there is no need to assume that they all do the same thing. Indeed, inhibitors are such widely different substances that it is unlikely they all produce the same responses. Some may depress enzymes that are needed for synthesizing viruses, some may encourage enzymes that destroy viruses, some may interact with virus-infected cells so that these die rapidly; all that needs to be postulated is that, on entering cells, they somehow disturb their metabolism so that introduced virus particles are precluded from multiplying, and that could happen in many different ways.

For our purpose, it is less important to know how these inhibitors work than to appreciate that entirely innocuous substances exist that can make plants resist infection by viruses to which they are normally susceptible. When sprayed over leaves, their effects can last for several days. Their behaviour superficially resembles that of a protective fungicide, although they function differently. Instead of interfering with the pathogen on the outside of the leaf, they penetrate

with it and then prevent it from multiplying. These substances have large molecules and, like the viruses, enter leaf cells only through wounds. To inhibit infection they must enter with the virus or immediately afterwards. Whether they could be used prophylactically as sprays in crops has yet to be tested critically. They are easily washed off leaves, but this is probably a minor difficulty that could be overcome by compounding with a suitable 'sticker'. They do not make leaves resist infection when viruses are introduced by aphids, and their use, if any, is likely to be limited to controlling the few viruses that are mainly spread mechanically, by such things as the rubbing together of infected and healthy leaves or by the handling of leaves. Prime among these is tobacco mosaic virus, which occurs in Britain throughout the tomato crop and causes losses more than enough to justify extensive trials to see whether the inhibitors can check its spread. Too much should not be expected from them; it is a far cry from the experimental conditions in which these substances have so far been found to have effects to those in commercial tomato growing, but they warrant testing as the only possible control measure yet in sight.

The inhibitors with small molecules that have so far been studied show less promise of having practical uses. They are soon absorbed into leaves and have only transitory effects in conferring resistance against viruses; also they can severely damage the host plants. The one most studied, thiouracil, interferes with the multiplication of tobacco mosaic virus in tobacco even when it is not applied until a day or more after the leaves became infected. This at first sight suggests a quite different mechanism from the other inhibitors, but this is not a necessary conclusion, for it may only reflect the fact that thiouracil readily penetrates deeply into unwounded leaves, whereas the inhibitors with large molecules cannot. Whether it checks virus multiplication because it becomes incorporated in the nucleic acid of the virus and makes the particles 'sterile', or because it interferes with the nucleoprotein metabolism of the cells, is a moot point. I favour the second interpretation, for effects on the host are only too sadly evident, and the extent to which it affects virus multiplication also depends greatly on the physiological state of the host. Oddly enough it has much more effect when conditions favour virus multiplication than when they are unfavourable. It does not act therapeutically, for tobacco mosaic virus already formed is not destroyed; it is prevented from multiplying further, perhaps simply because it is prevented from spreading to, and becoming established in, new cells. If thiouracil acts by interfering with the nucleoprotein metabolism of the host it, or something else with a comparable action, might possibly act therapeutically against less stable viruses than tobacco mosaic. Some of these may maintain themselves only by continued synthesis, and preventing their synthesis for some days might produce a virus-free, still viable host. Certainly the idea is worth testing, for it might lead to a method for freeing clonal varieties from viruses not amenable to heat therapy, or even to curing virus-infected trees.

Indeed, the increasing prevalence of serious virus diseases in many kinds of trees is perhaps the greatest stimulus to seeking therapeutants. About all that can now be recommended as a control measure is to destroy infected trees. This

is good advice, for it certainly does something to safeguard still healthy trees, but it does not exactly endear the plant pathologist to those who own affected orchards, cocoa farms or avenues of fine elms. They would care little that a curative treatment was temporarily damaging, provided it prevented the loss of capital entailed in the death of trees. And the total capital losses in cocoa and citrus alone now amount to many millions of pounds sterling.

THE USE OF INSECTICIDES

The attempts yet made to control virus diseases in trees by insecticides have not been promising, but that does not mean that methods will not be found. It was not so long ago that spraying with insecticides was also proving of no value in annual crops such as sugar beet and potatoes, but with the development of persistent insecticides the position is altering rapidly. It is still too soon to be sure how useful insecticides will prove, but that they can decrease the spread of viruses like beet yellows and potato leaf roll, there is now no doubt. Our present experience can perhaps be most simply summarized by saying that persistent insecticides properly applied to a crop will not usually prevent virus diseases from being introduced into that crop from outside, but they can prevent the spread of some viruses from infected to healthy plants within a crop. Thus their efficacy depends greatly on how outbreaks originate. If, as is usual with potato leaf roll in Britain, spread is mostly from plant to plant within a crop, and only a few plants become infected by infected aphids coming from distant crops, then spraying can be a valuable preventive. Similarly, with sugar beet, provided there is not a nearby source of yellows virus and aphids to supply many incoming infective insects, the customary increase in infected plants during the summer can be checked and an economic return obtained from spraying.

TABLE IV. THE EFFECT OF INSECTICIDES ON THE SPREAD OF TWO POTATO VIRUSES

<i>Treatment</i>				<i>Leaf roll</i>	<i>Virus Y</i>
DDT emulsion	...	...	...	1.3*	3.9
Malathion	...	...	...	0.0	6.0
Endrin	...	...	...	0.4	5.0
Systox	...	...	...	0.4	4.2
Unsprayed	...	...	...	37.5	18.5

Viruses are individual things, and to generalize about the ability of an insecticide to check the spread of viruses within crops is as dangerous as to generalize about their other properties. Two viruses of one crop may have the same insect vector, but the spread of one may be prevented by an insecticide and the other

* Results are recorded as the percentage of the plants, in the five on either side of infected ones, to which the viruses spread.

not. Spraying potato crops, for instance, may stop leaf roll from spreading but not virus Y, although both are transmitted by the same aphids, mainly *Myzus persicae*. This difference reflects differences in the speed with which an aphid can acquire and transmit the two viruses. After first feeding on a plant with leaf roll, an aphid cannot infect a healthy plant for some hours, so that insecticides can kill it before it can transmit the virus. By contrast, an aphid can acquire virus Y within a minute of feeding on an infected plant and can then immediately infect a healthy one, a process altogether too rapid to be interfered with by current insecticides. Many of the problems in controlling virus diseases would be overcome by the discovery of a persistent substance that either kills insects immediately they alight or acts as a repellent and prevents them from even settling on plants. It is probably asking a lot, but it is an order well worth trying to fill, for it would not only stop the spread of viruses within a crop but also prevent them from being introduced into the crop.

DISCUSSION

THE CHAIRMAN: It seemed not so very long ago that we had hardly a scent to follow up, but it now seems that the scents are so many that there is quite a risk that the hounds will get confused. Certainly I have not listened to a lecture for a very long time which opened up so many avenues, to use the political phrase.

MR. J. H. STAPLEY: I can hardly accept Mr. Bawden's last suggestion about the need for the insecticide which has an immediate action, because we have that already. All the newer phosphorus insecticides are active immediately, and one of them, for example 'Systox' of which we have considerable experience, certainly affects the aphid immediately it is put on. The first thing that happens is that the aphid withdraws its stylets from the plant, then it wanders about, and within two hours falls off the plant dead. I cannot foresee that those aphids already sprayed would wander off and infect other plants. I feel that it is most unlikely.

I suggest that there is some other explanation for this failure of insecticides to give complete control of the transmission of virus.

THE LECTURER: Mr. Stapley says that 'Systox' takes two hours to kill aphids and, although I agree this is rapid, it is still not rapid enough to prevent them from spreading viruses. The results of experiments in which sugar-beet plants sprayed with 'Systox' were colonized with aphids carrying beet yellows virus, leave no doubt that such plants can become infected. Similarly, viruses like potato virus Y can be picked up from an infected plant and transferred to another within a few minutes, and 'Systox' does not kill rapidly enough to prevent this process. Even viruses like potato Y do spread less often in sprayed than unsprayed crops, but something that acts much more quickly is needed before their spread will be completely prevented.

In defining my ideal insecticide, the word I should have emphasized was persistence, combined with either a rapid knockdown or with a deterrent action that would prevent aphids even from attempting to feed on the sprayed plants. Pyrethrins are well known for their knock-down action, but they do not retain this property for long after being sprayed on to leaves, and for our purpose we need substances that will remain active and continue for some days to affect aphids as they come into a crop. There are plenty of persistent insecticides that prevent aphids from multiplying in a crop and, by doing this, they will also tend to decrease the incidence of virus diseases; the extent to which they succeed will depend on the relative amount of

spread that occurs by incoming aphids and by aphids that are bred in the crop. What 'Systox' will not do is prevent an aphid that is already carrying a virus when it comes into a crop from infecting the healthy plant on which it alights.

MR. STAPLEY: Perhaps it has not been used strong enough?

THE LECTURER: That of course may be true, but it has been used stronger than is needed to prevent aphid infestation. I must remind you that the reason farmers grow sugar beet is not to spray it with anything, or even keep it free from yellows, but to get a profitable return for their labours. I do not know how much 'Systox' can be put on without either damaging sugar-beet or increasing costs prohibitively.

DR. A. F. POSNETTE: Mr. Bawden said that the inhibitors of virus infection would not inhibit when the virus is introduced by an aphid. He also said that inhibitors act on the host's metabolism rather than on the virus itself. I wonder whether it is true that these inhibitors will not work if the virus is introduced by aphids into the epidermal cells with feeding times of seconds only? If the substance is penetrating only to the epidermis, obviously to show any inhibiting action the aphid must inject the virus into the epidermal cells and not into deeper tissues. Has it been tried, with controlled feeding times, so that the virus has been introduced merely into the epidermal cells?

THE LECTURER: It was only inhibitors with large molecules that I was talking about when I said they would not affect infection when virus is introduced by aphids. Mrs. Watson and I did many experiments in which we tried to get these inhibitors into leaves in various ways, but none greatly decreased the number of infections produced by aphids transmitting non-persistent viruses, such as cabbage black ringspot, which seems normally to infect the epidermis. We have not tested the effects of inhibitors with small molecules, but I would expect them to inhibit infection whether the virus was introduced by aphids or by mechanical inoculation. We have not used them in tests with aphids because they seem to have no practical application, for many of the small inhibitors damage plants far more than the viruses you might have protected them against. The virtue of the big inhibitors is that none of them seems to harm the plant at all, possibly only because they do not penetrate the leaves.

What I think happens, though I may be wrong, is that the aphid injects non-persistent viruses into the epidermis in such a way that it does not also inject any inhibitor that is on the leaf surface. Tests in which infection is inhibited are done by rubbing the whole epidermis with inoculum, and the virus enters only where rubbing has made a suitable hole. At the same time, the hole will allow any inhibitor on the leaf at the time of rubbing to get in too.

DR. R. MARKHAM: What sort of criterion has Mr. Bawden for some of these inhibitors not actually becoming part of the virus itself? I do not work on this, but my colleagues have shown fairly conclusively that in some cases of plant viruses (R. E. F. Mathews) and some bacterial viruses (D. B. Dunn and J. D. Smith) this does occur, and the viruses produced that way are much less infectious.

THE LECTURER: In concluding that inhibitors were more likely to act by affecting the host plants than by combining with the viruses, I was thinking mainly of those with large molecules rather than the analogues of purines and pyrimidines. It is, of course, easy to show that ribonuclease and the inhibitor from *Phytolacca* sp. do combine with tobacco mosaic virus, for if the virus is mixed with them in the right conditions it promptly precipitates as paracrystalline fibres. Even when such mixtures do not precipitate, combination between inhibitor and virus can still be demonstrated by ultracentrifugation, when, instead of virus alone, a complex of virus

and inhibitor sediments. It is impossible to be sure that this combination plays no part in inhibiting infectivity, but that it may only be incidental to it is suggested by the fact that neither of the two inhibitors produced by *Trichothecium roseum* combines with tobacco mosaic virus and yet these seem to inhibit infectivity in much the same manner as inhibitors that do combine.

DR. MARKHAM: The point I wanted to make is that one can actually isolate the virus, clean it up, and find that the inhibitor is combined in the virus.

THE LECTURER: You are now talking about azaguanine?

DR. MARKHAM: Yes, and also bromouracil.

THE LECTURER: You realize, of course, I have not mentioned either of these substances. In discussing the action of thiouracil, the only pyrimidine or purine analogue with which I have worked, I said it was a moot point whether it inhibited the multiplication of tobacco mosaic virus because of its effects on the host plant or because it becomes incorporated in virus particles and makes them 'sterile'. I favoured the first interpretation because the adverse effects of thiouracil on the host plants are only too sadly obvious.

DR. MARKHAM: We do not think that thiouracil does become incorporated in tobacco mosaic virus.

THE LECTURER: If it does not, that only strengthens my idea that it acts by influencing the metabolism of the host. I fully accept the evidence that azaguanine and bromouracil become incorporated in virus particles produced in host cells containing these substances. This kind of combination, however, is quite different from the simple union between virus particles and inhibitors such as ribonuclease, which occurs when the two are mixed in a test-tube. What I do not yet accept is that the effect of these two substances on virus multiplication necessarily follows from their being incorporated in virus particles. Granted that such substances can be incorporated in the nucleic acid of viruses, we must also expect that they will also be incorporated in the nucleic acid of the host cells, and this seems to me just as likely to affect virus multiplication. There is no conclusive evidence one way or the other.

DR. MARKHAM: I think there is reasonable evidence because firstly, the nucleic acid turnover in the ordinary cell is fairly constant, whereas, in the virus particle, it is not, and Dr. J. D. Smith and his colleague D. B. Dunn have shown that in bacterial viruses you do get multiplication when bromouracil is there, and the virus particles so produced are not as infectious as normal ones. I think that the infectivity is reduced to approximately twenty per cent, which means that virus particles which contain the unnatural substance are not nearly as capable of further multiplication as ones that do not.

THE LECTURER: I quite believe that, but with plant viruses there is no good evidence that these unnatural substances produce particles that are not infectious. Certainly, from my experience, this cannot explain the behaviour of thiouracil. If plants are treated with this substance some days after the virus has been multiplying, further multiplication is halted, although there was a lot of normal infectious virus already in the leaf fully capable of multiplying had conditions not altered.

It is always nice to get a single theory, but we must remember that not all virus inhibitors need work the same way; some may act by affecting the metabolism of the host and others by affecting the virus directly. I hope those of the second type exist, for they will be the most useful for chemotherapy.

DR. POSNETTE: Can Mr. Bawden give some explanation of why, when these

leaves are floated in a thiouracil solution, we get a necrotic ring and not a necrotic spot? I think he said thiouracil produces necrosis where the virus had multiplied, but if so, we should expect a solid spot. The increase in the diameter of the rings with time after inoculation looks like the growth of a mushroom ring from a single spore, and suggests that the virus spreads radially from a single inoculation spot. We know that the virus has multiplied in the cells within the necrotic ring, so why is there not a necrotic spot? Is it because the virus multiplies less rapidly in tissues that have been infected for some time than in those that have just been invaded?

THE LECTURER: It is easy to see certain possibilities. The continuing increase in virus content of leaves with increase in time after they are inoculated, is probably caused principally by increasing numbers of cells becoming infected, rather than by the virus continuing to increase in cells that are already infected. I have no good evidence to support this, but I think that the virus content of a cell probably reaches its maximum within some hours of becoming invaded. If this is so, then the regions where necrosis occurs can be taken to represent cells only recently reached by the virus, and in which it is actively multiplying when thiouracil is applied. Certainly the size of the necrotic spots or rings do correspond closely with the advancing front of the virus as it moves from the initial entry points. The virus content will be higher in the middle of the circles than at the periphery. But at the centre it has probably reached its maximum and there is something like a steady state again set up. If we assume that both the multiplying virus and thiouracil interfere with the uracil metabolism of the tobacco cell, then we can conclude that, although cells withstand the effect of either interference separately, they succumb to both acting simultaneously. Certainly the presence of tobacco mosaic virus is not enough to give the necrotic reaction with thiouracil, for if this substance is applied to leaves that have long been systematically infected, the leaves do not die. Thiouracil, then, does not kill uninfected mature cells or those with a full complement of virus, so it is reasonable to conclude that the cells that die are those in which the virus is actively increasing.

MR. MARTIN SUTTON: Does Mr. Bawden envisage a time when in addition to spraying crops of, for example, potatoes with inhibitors, it will be necessary for farmers to treat all their potato seed with heat up to a temperature of 36° centigrade for a fortnight before planting?

THE LECTURER: No, I do not expect potato growers to heat their seed tubers. There is no reason why they should, at least in the United Kingdom, for adequate control measures against leaf roll were developed long before heat therapy was discovered. The practice of regularly buying new stocks of certified potatoes has virtually eliminated the losses of yield that were only too common twenty years ago. It is true that buying new seed is costly for the English grower of ware potatoes, but though he may grudge this exchange of money with the Scottish seed grower, I think he would prefer to continue the practice rather than try the tricky business of curing his own potatoes. The only use with potatoes I see for heat therapy in this country is to produce a virus-free clone from a variety the whole stock of which has contracted leaf roll. Such varieties will usually be new ones, for plant breeders often seem to be casual with their products and get them virus-infected before they reach the marketable stage. With established varieties, such as King Edward or Majestic, there are millions of healthy tubers and it is simpler to discard infected ones and replace them than try to cure them. In some other countries the condition is not quite so happy and potato stocks are often in a sad state. Where, as with the variety Phulwa in the plains of India, the climate will do the job without any trouble, large-scale therapy has everything to recommend it, but normally I would expect the treatment to be used only on a small scale, enough to produce a 'nuclear' stock that could then be bulked in conditions where virus diseases do not spread rapidly.

Although, with potatoes, I do not expect any extensive uses for heat therapy, I do with many other of the vegetatively propagated crops, stocks of which are now often virus-infected.

DR. R. E. TAYLOR: I understood Mr. Bawden to say that it is too early yet to pin much faith on the use of these inhibitors, but from articles in the popular press, there is every sign that tomato growers are becoming milk addicts. Would he suggest that they should temper their enthusiasm a little until the results of practical trials are known?

THE LECTURER: If you are asking what, on present evidence, I would advise a tomato grower to do with a pint of milk, I would say, drink it!

MR. ROY CROPLEY: Mr. Bawden showed a slide of the differential effects of certain inhibitors on *Nicotiana glutinosa* and beans. From that I think he concluded that the effect on the inhibitors was due to their effect on the host plants, but according to the slide, he was putting tobacco mosaic virus into the glutinosa, and tobacco necrosis virus into the bean, from which it seems to me not possible to determine whether the inhibitors were affecting the hosts or the viruses.

THE LECTURER: It is quite true that that slide alone does not establish the point. However, I can assure Mr. Cropley that, had I used the same virus, say tobacco necrosis, on the two plants I should have got the same kind of result. This we know from the very many experiments that have been made, comparing the effects of a range of inhibitors with different viruses on the same host and with one virus on different hosts. The experiments recorded in the slide were done primarily to compare the relative effects of different inhibitors, and so tobacco mosaic virus was inoculated to *N. glutinosa* and tobacco necrosis to French bean, because these are the virus-host combinations most suitable for quantitative work as they give the most easily counted local lesions. This host-specific effect shows with thiouracil as well as with the other kinds of inhibitors; for instance, tobacco necrosis virus is prevented from multiplying in tobacco leaves but not in French bean.

MR. J. NEWELL: I was sorry to hear Mr. Bawden say that there was little hope for the spraying of tomatoes with milk as a control for virus. We have used this now for two years at the John Innes Institution. Indeed Mr. Bawden has inspected these plants for us, and I can say with confidence that certainly on last year's results we had a hundred per cent control with milk-sprays for tomato mosaic, and this was, I believe, a particularly virulent form. We are again using it this year. A number of growers have told us too, that although they have not used milk sprays experimentally, they have had very good results with it during the past season. We, unfortunately, are not able to do any properly controlled experiments at the moment, but I believe that such experiments are being done in this country. Our own results lead us to think that there is some hope for the control of tomato mosaic by milk spraying.

THE LECTURER: I did not say that I had no hope that milk or other inhibitors would help to control tomato mosaic. Indeed, I have long thought they have potentialities that warrant testing, and your plants were sprayed at my suggestion, though I wanted some controls. What I said was that, on present evidence, I would advise a tomato grower to drink milk rather than spray it on his crop, for there is experimental evidence that it has nutritive value for him, but none that it controls tomato mosaic. Until the controlled experiments that are now being made are finished, it is impossible to know what value the spraying has. That there was less tomato mosaic at the John Innes during the last two seasons than in the previous years, may be because the plants were sprayed with milk, but it may equally have some other unknown cause.

27TH MAY 1955

VIRUS DISEASES OF PLANTS

THE CHAIRMAN: It is now the time to let our lecturer off. I am sure you would wish me to thank him for this exposition of what is still a very new subject. I think you would like me to congratulate him on his own contributions to the subject, and I feel sure that we all wish him, and every other sportsman who is in this field, good hunting.

A vote of thanks to the Lecturer was carried with acclamation.

MR. A. R. N. ROBERTS (A Vice-President of the Society): No audience which has ever had the privilege of Sir James Scott Watson in the Chair, with his genial and illuminating presence, can wish to disperse without paying due acknowledgments to him. May I, Sir, also convey to you the thanks of the Council of this Society, of the Directors of Plant Protection Ltd., and I am sure of our Lecturer, whose wit and wisdom have brilliantly upheld the high traditions of this series. I have been asked to explain that the letters F.R.S. after Mr. Bawden's name do not mean 'Fernhurst Research Station'! That is the one distinction in his field which he has yet to attain.

Our Chairman has lately retired, as many of you will know, from the post of Director-General of the National Agricultural Advisory Service. I have always thought that the word 'General' in his title was very appropriate, because I bracket him in my own mind with General Baden-Powell and General Booth, both of whom started social organizations that proceeded through criticism and even ridicule to become much respected parts of our national life. So, Sir James, you may be quite sure that future generations enjoying the services of the N.A.A.S. will continue to regard you as a successful administrator.

Those of us of to-day who have had the privilege of your friendship have many other things to thank you for. You have taught us by precept and even more by example. Most sincerely do we thank you and wish you well.

A vote of thanks to the Chairman was carried with acclamation, and the meeting then ended.

THE DETECTION AND PREVENTION OF ANTI-SOCIAL BEHAVIOUR IN YOUNG PERSONS

The Peter Le Neve Foster Lecture by

SIR BASIL HENRIQUES, C.B.E., M.A., J.P.,

*Chairman, East London Juvenile Court, delivered
to the Society on Wednesday, 27th April, 1955,
with Miss Margery Fry, M.A., LL.D., J.P.,
in the Chair*

THE CHAIRMAN: I understand that Mr. Le Neve Foster, in whose honour these lectures were founded, was himself a great lover of youth and a great worker for youth welfare. That in itself is an absolutely adequate reason for Sir Basil Henriques having been asked to give this lecture this afternoon. But I think it would be an unpardonable mistake to assume that his subject is of interest only to those people who are sometimes, I think rather unfortunately, referred to as 'youth workers', or even to people who are interested, outside detective stories, in criminal questions. This question of delinquent childhood has enormously wider values.

For thousands of years, medicine considered that the curing of illness was its one function. In our own times, medicine has come to see that more important than the curing of illness is the preservation of health. Something almost exactly analogous is happening, I think, in the wider realm of mental health in its most general terms, so that we are now much more inclined to study the causes of maladjustment than simply to treat them or even to punish them. This has its bearing on something wider even than the prevention of crime, because maladjustments which show themselves so conspicuously in the children's court are exactly the same type that ruin the happiness of so many homes when they show themselves in failure of human relations which is not criminal, though anti-social.

For that reason I feel that Sir Basil's lecture will have a particular bearing on a great many problems outside the immediate one of Juvenile Courts and juvenile delinquency. We could have no one more qualified than Sir Basil, who has spent so much of his life in the service of youth. We could have no better exponent of this wider idea of mental health than we have this afternoon, and I therefore have great pleasure in introducing Sir Basil Henriques.

The following lecture was then delivered:

THE LECTURE

It is very seldom that there appears before the Juvenile Court a boy or girl of average intelligence who comes from a home where both parents are living happily together, in a district which is devoid of slums, and which has an adequate number of Youth Organizations and of open spaces where children can give vent to their natural exuberance of high spirits.

Those who do come before the Court generally have something wrong, either in their environment or in the make-up of their personality, which may in itself be due to their environment. The cases may be roughly divided into the mischievous young law-breakers and the unhappy problem children who so very easily develop into far worse criminals than those who are usually known as delinquents.

The sooner the symptoms of a disease are detected, the greater is the likelihood of the treatment being successful. Where there is danger of a family breaking up, or of a child breaking down, the earlier the symptoms of decay are noticed and treated, the better are the chances of a speedy recovery and of preventing the rot from spreading. Treatment started at a late stage takes much longer and the chances of a complete cure are more remote. The weakest part of child welfare work in England is its preventive side—the side which is, in fact, far and away the most important. Although an all-embracing constructive scheme of child welfare would need legislation, considerable improvements could be achieved with administrative changes only.

The youth of to-day are frequently described as depraved. It would be more correct to use the cockney pronunciation of that word and to describe them as deprived, indeed as more deprived than any other generation has ever been in our long history. Never before have babies and young children had to be torn from their mothers, and sent to places of safety in strange mansions or in strange foster homes, to be cared for by strangers during the most impressionable years of their life. What ought to have been a care-free childhood was spent in fear and anxiety, amid horrors and sorrows. At the end of the long years of war, the children were returned to their mothers who had become strangers to them. Later still their fathers returned to their mothers, to whom in so many cases they too had become strangers. It is impossible to exaggerate the effect of these separations upon those who were born between 1939 and the end of the war. The strangeness of their parents to one another was as devastating as the strangeness of the children to their parents.

Many had formed deep attachments to those who had fostered them during the evacuation, and they found it difficult to adapt themselves to the new environment of their own homes, preferring in some cases the homes which they had now to leave. Others had been unhappy in their foster homes and had built up for themselves dream visions of their own homes, only to be disillusioned by mothers who had grown used to a life of freedom without them, and who did not welcome them back with the loving enthusiasm that they had anticipated and longed for. When at length the fathers rejoined the family group, they were ignorant of the idiosyncrasies of their children; they had had no share in the formation of their characters. Used to military discipline, some were over strict, demanding more than their children could give; others attempted to win their affection by over indulgence, which was as bad for them as over strictness.

The war years have produced many problem children, but what is of even greater importance they produced many problem parents. Normally a newly wed couple find the first few years of home building a difficult period. They have to

get used to one another and to learn to share their work as partners. The love which they bear for each other enables them to be tolerant and forgiving of one another's weaknesses. But when one of the partners goes off almost immediately after marriage, and remains away from his young wife for several years, they are unable to grow up together in this way and when eventually they are reunited, they find that they have changed and are different from when first married. They have each become accustomed to their own way of living. They have to start their courting days anew, and so often the original emotions which had drawn them to one another are never again aroused. The result has been unhappiness and friction which has ended in separation or divorce.

A child flourishes in an atmosphere of love and serenity in the family circle of his own home, secure in the affection bestowed upon him by both his parents, reacting to the relationship which exists between his mother and his father. He is conscious of any tension which may exist between them and is torn between his loyalty to one or other of them. It is no wonder that the child to-day should cry out, 'Alas, I am no better than my father'. The miracle is that on the whole he is no worse.

Some of the law-breakers are just ordinary boys with an admirable but very perverted sense of initiative and courage. They break the law because they are full of vitality and have no proper outlets for their high spirits. Even some of the cases of grievous bodily harm are perverted forms of ragging, in which those of the same age in the public schools and universities indulge with impunity, because they have the opportunity to do so and because they have learnt when to stop. It is not permissible to do in an open highway what can be done within the cloisters or quadrangle of a school or college.

Most healthy boys love competing and they love to take risks. There is probably no game quite so exciting as that of competing against the police, no risk so worth-while taking as that of climbing a drainpipe and breaking into a factory. This game becomes all the more exciting if the chances are that the perpetrator will not be caught. According to the latest statistics only 46 per cent of the known indictable offences committed throughout the country are detected, and of course every young delinquent is quite certain that he will be among the 54 per cent who will not be caught. If these offences of adventure are to be prevented, then three things must be done

In the first place, the Police Force must be brought fully up to strength and their methods of detection improved, so that the chances are that an offender will be caught. Secondly, there must be a sufficient number of open spaces where children and young people can play, and learn to play the game as sportsmen. Thirdly, there must be adequate opportunities for them to spend their leisure in a useful and constructive manner.

The various youth organizations provide them with an opportunity to do this, but unfortunately at the present time all the youth organizations are without a sufficient number of leaders and helpers of the right calibre to run them. Men and women do not realize that the boys and girls who are so much better off materially than they used to be, need the further education and character

training which a good youth organization can provide for them. They need it both spiritually and physically, quite as much as those who used to be so obviously deprived. Indeed, in some respects they need it more than before, for there has been such a great slackening of discipline both in the homes and in the schools. Furthermore, many of the boys between the years of 15 and 18 are unsettled, knowing that their careers are to be interrupted by a call-up for National Service at 18. This tends to determine them to have a good time whilst they can and, as they are earning such high wages, they tend to spend their money on ephemeral pleasures instead of seeking that inward contentment which should last them the whole of their lives. Thus, a great many of them are wasting these precious years of adolescence. In a good youth organization they would have all the chance they want to compete on the football ground or in the boxing ring; they could take risks in the gymnasium, or in adventurous activities and would have given to them a vision of all the richness which life holds out for them.

The real problems of the Juvenile Court are not the adventurous and mischievous delinquents, but the unhappy, disturbed and unsettled children who so very easily become delinquents, and it is in respect of these that the present methods of detection and of prevention in this country are so extraordinarily weak. The weakness is due partly to a lack of co-ordinated direction of the various agencies which are dealing with deprived and difficult children, and partly to the delay in taking action—before any serious deterioration has had time to set in—as soon as something wrong has been detected either in the child or in his family.

Child welfare work in New South Wales is considered by many to be the best in the world, and the suggestions now made are to a large extent based upon what has been seen there. It has resulted in far fewer deprived children being either committed, or received into care; in many more children being dealt with voluntarily without ever having to come before a juvenile court, and in a great diminution, in ratio to the increasing population, of the number of delinquent children being sent to approved or residential schools. The reasons why it has been so successful are quite simple. Every aspect of the well-being of children is under one Ministry, instead of, as in England, being divided between the Ministry of Education, the Home Office, the Ministry of Health and the Ministry of Labour.

New South Wales has concentrated on preventive work. It is convinced that money is well spent if it can save suffering among children, and can help to build them into the grand citizens which they nearly all could be, and which so many of them actually are. New South Wales recognizes that money is economically spent if it can save children from being separated from their homes, and thereby becoming a very heavy burden on the tax payer in public institutions.

When a child is showing abnormal behaviour, it nearly always means that he is unhappy at home. When family relationships in the home are tense, it generally results in some emotional strain in the child, which leads to abnormal behaviour. It is essential that such symptoms should be detected and treated at the earliest possible moment. There are many agencies which come into contact with the

child and his home from the day of his birth until he becomes 17. The health visitor probably knew his mother before he was born, as also will the housing manager if she lives on an estate which employs one. He may have been in a day nursery or a nursery school. Once he is in the primary school, and until he leaves school, he is known intimately by the teaching staff, and out of school he may be known to the leader of the play centre or the Cubs or Scouts, and later to the leader of one of the other voluntary organizations such as a Boys' Club or the Brigade or the Pre-Service Cadets. Eventually he will contact the Youth Employment Officer. A very great deal about him and his family will always be known to their immediate neighbours. Some of these people are certain to have noticed if there is something wrong. At the present time they do not know what they ought to do about it, and the result is that though the symptoms have been spotted, no action is taken and the situation deteriorates and the rot spreads.

In order to avoid this happening, there should be established in every town and in every district of the cities a Child Welfare Office, to which anybody who is concerned and worried about the well-being of a child can feel he can go for advice and guidance. The building must be worthy of the purpose for which it exists. The Municipal Offices of most local authorities are housed in fine premises which quickly catch the eye of passers-by. There is surely no department of a local authority which is doing work as important for the future of the country as the one which aims to save children, and to prevent them from becoming a burden to the State and a misery to themselves. The Child Welfare Office, therefore, must be beautiful and inviting and welcoming. The waiting rooms must be tastefully decorated in soothing, simple colours, and the interviewing rooms must be arranged so as to make those who are seeking advice feel relaxed and at ease, for it is essential to put an end to the feeling which now exists that there is something shameful in applying for assistance to deal with domestic and children's problems. Presiding over this office, as Director of Child Welfare, must be the Children's Officer.

This inviting and artistically equipped building may sound an extravagant proposition. But in the end it would prove to be an economic and also an economical one, for it is envisaged that in this building would be housed the headquarters of the statutory and voluntary organizations which deal with the welfare of children and young persons: the Children's Officer, the Probation Officers, the Education Officer, the Youth Welfare Officers, the Youth Employment Officers, the Moral Welfare Worker, the National Society for the Prevention of Cruelty to Children, the Adoption Society, the School Care Committees, the Invalid Children's Aid Association, the Family Welfare Association, the various National Youth Organizations, the Health Visitors, the Marriage Guidance Council and the Family Service Unit. This is not an unrealizable fantastic dream, for already in Manchester many of the voluntary organizations whose purpose is to help children and young people, have their offices at Gaddum House in Queen Street.

The Juvenile Court should hold its sessions here. Although it has to deal with certain cases which merit and receive punishment, more and more is the Juvenile

Court coming to be looked upon as a Court of Justice which aims at helping unhappy children, rather than as a place where punishment is meted out to them. Indeed after a case has been proved, it does in fact become 'a hospital for moral diseases'.

Here also, in close proximity to the Court, should be the Child Guidance Clinic, so that the psychiatrist can, without undue trouble, come to the Court when asked to do so by the Magistrates, to elaborate on the reports which he may have sent to the Court.

The overhead expenses of all these different organizations would be considerably cut, and the rent received from them could make the scheme an economic proposition. But it should also be an economical one in the enormous saving of time and energy in the essential co-operation which simply must exist, in the future, between these various organizations, all of which can play a part in the welfare of children.

The Director of Child Welfare would be able immediately to refer to the appropriate organization those who come to him with their problems. They could be dealt with without the delay—often fatal—which now occurs. Parents, for example, are more likely to make an appointment at the Child Guidance Clinic if they can go direct to the clinic without having to make an extra journey on another day. They would be more willing to consult the Probation Officer once they had been persuaded that this was the right course to take, instead of weakening and changing their minds, as they so often do when they have to go to the Probation Officer's office in a different part of the town and perhaps on a different day.

This Child Welfare Office should be a place to which anyone can go, or even write, if they have any fears that something is wrong with a family or that the children are being neglected or unhappy. But, most important of all, the parents themselves would feel willing and anxious to bring their problems to the Office before matters had deteriorated so much that court proceedings might be necessary. A parent on the verge of breakdown, for example, could be helped not to reach the point of despair at which she neglects her children, if only at an early stage she could be given convalescence and rest, and arrangements made for her children to be temporarily boarded out.

Matrimonial reconciliation work could be done as soon as either spouse felt that the relationship between them was reaching an intolerable point.

A mother, worried about her adolescent daughter who was taking no notice of her, mixing with undesirable companions and staying out late at night, would come for help before the girl decided to leave home and went seriously wrong.

The parent of a boy who was stealing at home, or showing temper tantrums, or other behaviour problems, would seek advice at the early stage of his anti-social or maladjusted behaviour, before he reached the stage where he had become really delinquent or beyond control.

The local Children's Officer would thus have brought to his notice those cases which have been first spotted by the Health Visitor or housing manager; those referred to him from the school or by the leader of the play centre or of the

youth organizations; those whose parents voluntarily seek his advice either about their child, or about the home situation which may be affecting the welfare of the child; those about whom he has had information from neighbours. It would then be his duty to decide what action to take, and who should undertake it. At present no one is clear as to which agency to go to, and no one is responsible for deciding what should be done.

An excellent example of the lack of co-operation between various agencies dealing with children, and their failure to prevent suffering, is that of a recent tragic case which hit the headlines of nearly every newspaper in the country with such words as 'Starving girls ate bread put out for birds'. About two years ago, the mother of two little girls, who are now aged five and six, died and they were received into care by the children's officer. Sometime before this a girl of 16 was before the Court and was committed to the Mental Defective Colony. She escaped, and while she was an absconder she met the father of these two children and married him. The authorities did not recall her, but allowed her to remain with her husband under the supervision of its After-Care Officer. As there were now two parents to look after them, the children were sent home. The teachers soon noticed that the elder one—who was the only one then at school—was degenerating and was losing weight and seemed unhappy. When the younger one was admitted to the school, she appeared to be ravenously hungry. In spite of the fact that the father at first refused to let them go, they were put on school dinners. In the bitterly cold weather at the beginning of 1955, they came to school in cotton frocks and were badly shod, and they had to be sat on the radiators in order that they could be thawed.

It was at this time they scrambled after the bread thrown to the birds. They had for some time said they were frightened of their father and asked if their dolls could be kept in school, as he said he would destroy them if they took them home. Eventually, one afternoon, the children flatly refused to go home and cried hysterically. The head teacher wisely called the police, who brought them before the Court as in need of care or protection.

The father, in Court, said that he had several times begged for the children to be received into care as he did not want them and could not look after them. The head teacher testified that the father had often been to the school to ask to have the children sent away.

Thirteen months before this, the health visitor who was supervising the younger child referred the case to the N.S.P.C.C. About six months ago, neighbours reported to the N.S.P.C.C. that these children were never allowed to play in the street, but were kept in a small back yard. If they were naughty, they were put in a corner of the yard and if they moved, they had a dog let loose on them and this absolutely terrified the children. The Children's Officer knew about the case, because the children had been in care and also because the father had asked for them to be received back into care. But because there were two parents at home he would not—or could not—take them back again. The School Care Committee workers knew the family because they provided clothes for them, and these had been sent back by the father. The

Education Department knew the family through the head teacher, and probably through the School Enquiry Officer. The family had been under the supervision of the after-care officer for mental defectives the whole of this time. In spite of all these many agencies dealing with the case, no action was taken and these children were allowed to suffer in this appalling manner for at least 14 months.

When the police visited the home, they found the stepmother had a child of about one year old and was expecting another one. In spite of the fact that the children said they only had bread and water for breakfast, the room was full of cigarette ends, and the stepmother was actually smoking when the police arrived.

Everyone had passed this case on to the N.S.P.C.C., and no action was taken by them because they were thinking in terms of punishing the parents and not of saving the children, and there was not sufficient evidence to charge the parents with cruelty because there were no bruises to be seen. There is something radically wrong somewhere that in this welfare state children can be allowed to suffer in this way.

One of the greatest weaknesses in the present system is the way absenteeism from school is dealt with. It is one of the sure symptoms that there is something wrong somewhere. The School Enquiry Officers are among the worst-paid servants of the local authority, and yet they ought to be the most qualified and highly paid. Their job should not be merely to get the child back to school, but to find out what are the real causes which are keeping the child away from school. The cause may lie either with the child or with the home, or even in some cases with the school itself. There are negligent mothers who do not take the slightest interest in the education of their children, those who say they cannot read themselves and therefore see no reason why their children should learn to read. But there are also mothers who are not so unintelligent, and indeed who are very good at mental arithmetic. They have calculated that it is cheaper to pay the fine inflicted upon them when they are summoned to the adult court for the non-attendance of their child at school, than it is to pay for a sitter-in. This could be very easily stopped by the magistrates in the adult courts inflicting such fines upon them, that it would be cheaper to pay for a sitter-in than to keep their children at home.

The cause may lie with the school which has failed to understand that the child is so disturbed and unhappy that he cannot face the difficulties at school—either socially or educationally. Absenteeism forms a vicious circle, for the child who has been kept at home by his parents finds that he has got so behind the other children in his class, that he stops away of his own volition and becomes a truant.

The child is like the adult; if he is not doing what he ought to be doing, he is invariably doing what he ought not to be doing. The distinction, therefore, between truancy and delinquency is a very narrow one, for the child who is not in school very quickly gets into mischief, and comes before the court as an offender. The number of offences committed by children of school age whilst

they are truuanting from school is quite remarkable. It is essential, therefore, to treat irregular attendance at school as a most serious matter, and that is exactly what is not being done now.

The School Enquiry Officers should cease to be under the Education Department, but should be highly trained families case workers under the Children's Department. One reason for advocating this is that the fewer officials there are dealing with a family the better, and should the children eventually have to be received or committed into the care of the local authority, it is the Children's Officer who will be responsible for them. He would then be in a better position to deal with them, having known each child, and his family, throughout his school career.

If the School Enquiry Officer's work is done by the child welfare officer, the teachers in school would not only refer to him cases of absenteeism: he would also be told about the children who come to school dirty and untidy or who are persistently late; any children who may be showing behaviour problems; those who have fearful fits of temper or who are always bullying other children; those who are persistent liars; those who are known to be stealing and above all, about those whose behaviour the teacher has noticed to be changing from, for example, that of a happy carefree sociable laughing youngster, into that of a morose, sulky child who takes no interest in his work or in his games and who is lonesome, and unwilling to mix with other children either in or out of the classroom.

The teachers themselves cannot possibly deal with the background causes in the home of a child behaving in such a manner, nor are the parents likely to come up to see the head teacher even when asked to do so by him, for they are the kind of parents who just do not care. For the same reason they would not join a Parent-Teacher Association, which can do such excellent work in creating a good relationship between the school and the parents. Unfortunately the parents who would most profit from belonging to such an association have no desire to join it.

The Enquiry Officer, therefore, can and should be the link between the school and the home, and if he were under the direction of the Children's Officer, he should be in a position to do the necessary family case work and to have the co-operation of whatever other agencies can assist him. At present, the Education Officers and the Children's Officers are often working in watertight departments.

One of the greatest weaknesses in preventing those who have been trained in approved schools from committing further delinquencies when they leave, lies in the approved school after-care systems. Recidivism is becoming increasingly higher, in spite of the fact that the cost of training is tremendously greater. What is being done now is to reform the delinquent, and to leave unchanged the family conditions which probably caused his delinquency. Work on the family of a child or a young person committed to a school or Borstal should commence the very day that he enters the school.

The Court at the present time has the power to commit even a delinquent to the care of the children's department of the local authority; it is suggested that all children under the age of 15 who require residential training should be

committed to the care of the local authority. This would mean the abolition of all approved schools for those under that age. At the time of committal, the Court does not really know how long it will take to reform a boy or girl and still less how long it will take to reform the home.

When an approved school order is made, there is no power to prevent a delinquent from returning to his own home at the expiration of the order, whether the home is fit to receive him or not.

When he is committed to the local authority, the authority is *in loco parentis* until he reaches the age of 18. Furthermore, insofar as the local authority—for reasons of economy—will not want to have more children than are necessary in care, there is a very real incentive for the Children's Department to try and get the home improved as quickly as possible, so that it becomes a fit place to which the child can be returned.

It is not suggested that approved schools should be abolished, but that they should all become 'residential schools', and that there should be a pool of all the existing approved schools at the disposal of all the local authorities, so that the right child can be sent to the most appropriate school. The local authority now shares with the Home Office, and with the parents, the cost of the maintenance of a child, whether he is in a Home Office approved school or in one of the residential schools of the local authority. By having this pool of schools for delinquent children, the children's officer would be in a position to know whether it would be for the benefit of that particular child to go to a school which specializes in delinquents, or to an ordinary residential school, or to be boarded out with foster parents.

At the present time, there is no incentive to the parents to improve the conditions at home, because the licensing of a child in an approved school is in the hands of the managers of the school. But when the child is committed to the local authority, the parent always has the right to summon the authority to have the Order revoked, and if the parents want to have the child home, they will do all they can to make it a home fit for him to be returned to.

The time has come when a long-term policy for the welfare of children should be seriously considered. Eventually there will surely have to be established a separate Ministry which will be responsible for the welfare of all children up to the age of 17. At present, the pre-school children come partly under Health and partly under Education; the school children come partly under Education, partly under the Home Office and partly under Health. Those over 15 come partly under the Home Office, partly under Education, partly under Health and partly under the Ministry of Labour.

The Children's Department of the Home Office, which is a very large one doing most excellent work, should be combined with the Ministry of Education and become a Ministry for Juvenile Welfare, which would be responsible for the work now undertaken by the Ministry of Education, by the Children's Department of the Home Office, by the National Youth Employment Council of the Ministry of Labour, and by that department of the Ministry of Health which deals with children of school age and under. Its establishment should

result in far greater efficiency than now exists with all these overlapping Ministries. There would be an economy of time in administration and an economy of money in the number of civil servants required. Above all, the preventive and curative work among children and young persons would be carried out with less muddle and delay, and it would be done in co-operation with the constructive work of the various types of schools which influence the lives of the normal and the physically, mentally and socially handicapped children.

Considering the tremendous importance of the work to be done by this new Ministry, it is to be hoped that the Minister responsible for it will be one of Cabinet rank, with sufficient vision to see that the future happiness as well as the future strength of the nation depends upon his wise administration of the welfare of her future citizens.

At a lower level, the County Councils would appoint a director of juvenile welfare who would direct and co-ordinate the work as it is envisaged the Minister would do at a higher level. So much could even now be achieved if only there were more co-operation between the various departments of a County Council—open spaces for play and accommodation for the youth organizations on the new housing estates, the re-housing of overcrowded families which may be causing delinquency among the children, convalescence for mothers, on the verge of breakdown, immediate suitable treatment for those who have been certified as maladjusted, and special tuition in school for those who are mentally retarded.

These are some of the causes of unhappiness and of delinquency. They can be, and therefore they must be remedied, for they constitute cruelty to children, which is as reprehensible when committed by the State, as it is when perpetrated by an individual.

DISCUSSION

MISS L. NORRIS: The freer discipline in schools to-day is one matter which might be altered a bit if the public would make some sort of protest. There are many schools to-day, both elementary and higher schools, in which the Headmistress will say very proudly 'we have no punishments'. She does not mean corporal punishments, but no punishments of any kind.

I have known of actual cases, as I have done some teaching, where children have stolen substantial sums of money—in one case it was 14s.—and no notice was taken. It seems to me unfair to bring up a boy in that way in school, able to steal money with impunity, with no attempt to show him that the way of transgressors is hard. Then when he goes into his first job and he steals, he finds himself in the hands of the police.

THE LECTURER: I think that the discipline in the free-activity schools, the so-called progressive schools, when they run amok is one of the most serious things we have to deal with to-day; this is the kind of school, and they are run by local authorities, where there are no punishments, no rewards, no competitions and no repressions. They just are not a preparation for life. I see no reason why there should not be rewards or competitions. Life is made up of competition, and as long as one has tried one's best, I do not see why there should not be rewards at the end of it.

These schools have no competitive games; you compete against your own height, or your own speed in racing. You play hockey, but you do not play to win. I am not quite sure what you do play for, but you must not play to win, because that creates

hostile feelings against the opposing team, and this may eventually end up in international war! You must have no punishments of any kind. This is an extraordinarily bad preparation for life. A boy of 15 who comes late every morning to school is not punished, but is told of the importance of punctuality. He might try to do exactly the same thing when he goes to work, and one can so well picture his foreman arguing with him as to the advisability of coming in early!

As for the 'no repressions'. You are all being repressed at the present time. Life is made up of repressions, and furthermore life is not made up of doing the things you want to do, but of doing the things that need doing whether you want to do them or not, just because they need to be done. I think that parents are beginning to be dissatisfied with this kind of thing.

MR. J. J. GLADWELL: I represent the National Society for the Prevention of Cruelty to Children, and I would like to apologise for the fact that the Director of the Society cannot be here to-day to answer Sir Basil Henriques. He is at the moment taking part in a television programme on Juvenile Delinquency. He did, however, ask me to say that he is very much concerned with what Sir Basil was going to say about the Society, and that he would gladly meet Sir Basil on any occasion in public debate.

We disagree with the facts as given by Sir Basil, and we take very great exception to the statement that all we think about is the prosecution of parents. That is the last thing we think of. Our cases amount to 40,000 a year, but only in one per cent of these do we prosecute. Also, in regard to parents being frightened of us, which is more or less what is implied, we have 8,000 of them every year coming to the Society for help and advice, and we are very pleased to give it.

We do not think that the cause of child welfare can be advanced by too much criticism unless it is backed by fact. Now Sir Basil, I am afraid, did not call upon us before he made this statement, to find out the actual circumstances. We regret that, because we should have been only too pleased at any time to go into any case with which he was at all concerned.

THE LECTURER: I had a long letter from the Director last Saturday. The facts that I have stated about this particular case are the facts as taken from my notes during the hearing of the case and there is not a single word in my description of that case which is not in accordance with the facts.

I have never suggested that parents are frightened to come and see the National Society, but I do say that it is not necessarily something to be proud of that only one per cent of the cases are taken to court. Nobody wants to see the family broken up, but nobody on the other hand wants to see children suffering in a family which cannot be cured and changed whilst the children are there. Furthermore, I do maintain that the Society (I am sorry this has been brought up, but I must answer what has been said) is continually talking about whether they do or do not prosecute parents. They talk a very great deal about physical cruelty and, in my opinion, their inspectors are not capable of detecting mental cruelty.

DR. A. E. BLACKBURN: I should like to ask Sir Basil if the delinquents and children with anti-social behaviour are not really cases of mis-directed energy, and that the best method of treating them, as I have found at Pinjarra, W. Australia, and other places, is by putting them on a farm.

THE LECTURER: I did say that the cases can be divided into the unhappy children, and the thoroughly healthy ones who are showing the very kind of spirit of adventure that we want to see in young people to-day. They show a spirit of adventure and initiative.

We cannot, unfortunately, put them on farms unless they come before the courts. What we can do is to try to get them into some kind of youth organization, and

then to hope that the local Youth Committees are organizing a sufficient number of open spaces for the children to give vent to their high spirits.

I would assure you that many of the approved schools have just that kind of farm life which is so excellent for them, but, of course, we do not want to commit children to these schools unless it is absolutely necessary to do so.

MRS. E. MUNRO RUNTZ: Could I ask about the New South Wales experiment? Was it set up as an original scheme, or was it as a result of seeing the conflict between various authorities dealing with children's welfare?

THE LECTURER: I think it was set up as an original scheme after the war. Mr. Heffron was then Minister of Education, and he put in as the man in charge of child welfare someone who had never done it before, but who had been an excellent Civil Defence Officer. I think that Mr. R. H. Hicks worked out the whole scheme himself. He was over here this year, and he saw a good deal of our work and he has been to America. He has of course adopted a great deal from other countries, but it did start off, I think, as a single new office working under the Minister of Education.

MR. J. L. SCOTT (Governor, H.M. Prison, Brixton): I should like to ask if it is the case that children who are committed by the court for care and protection carry the stain for the whole of their lives? Why is it that a child deprived of his parents, and committed to an orphanage, does not bear the same stigma throughout his life, but whenever the other child is later in trouble, it appears on record that he had been to an approved school for care and protection?

THE LECTURER: I do not think there is any stigma attached to those who are beyond control or who are truants, or in need of care or protection. They would probably be committed to the Local Authority, and go to one of its residential schools, and not to an approved school.

There is an undoubted stigma, I am afraid, for those who have been found guilty or who plead guilty to an offence in the Juvenile Court, and that is something I would very much like to see changed. Under the 1948 Act, the Court can discharge a defendant either absolutely or conditionally. Now if you are eight years old, and you are charged by the Police for some extremely minor offence, and you are given an absolute discharge, that absolute discharge remains on your record for all times. I think that is absolutely wrong. If you are given conditional discharge, you are told that the treatment of the case is postponed for one year, and that if you do not get into trouble again during that year, then this case will be finished. Nevertheless, both an absolute or a conditional discharge remains on your record for the rest of your life. I think one of the things we have to do is to see that there is an amendment to the Act so that anyone who gets an absolute discharge or a conditional discharge shall, after a period of, say, five years, have that completely wiped off his record. I think it is very wrong indeed that he is scarred as a delinquent or someone found guilty of an offence for the rest of his life.

With regard to an approved school, there is a slight stigma, but far less than there used to be. But it is for that reason that I want children under 15 all to go to residential schools and not to approved schools. For those over 15 years, I want to change the name of Approved Schools into Senior Training Centres, and I want to abolish the word 'Borstal' altogether. As soon as you have jokes on the music hall about Borstal and the old school tie, then it is time to change the name. There would be far less stigma for those over 15 years of age if all those between 15 and 21 years went to a Senior Residential Training Centre rather than to a Senior Approved School or to Borstal.

MR. H. BAILLIE RITCHIE: Would Sir Basil tell us if there is any evidence that children

attending schools in which religious orders take an interest are better behaved than other children? I am thinking of the Roman Catholic Church, the religious Society of Friends and one or two others. It would be very interesting to know. I imagine that religious influence, if extended to the schools, must have some effect.

THE LECTURER: I am quite sure that religious influence has a tremendous effect. But whether teaching religion in school is the same as giving them religion, I am very doubtful indeed. I would not like to say that a child who attends a denominational school where religion is specifically taught, is one scrap better than a child who attends an ordinary school. On the other hand, the child who has had his religious faith inculcated into him in his own home is very seldom before the court, and there religion plays a very great part indeed in his life. Religion can be taught—faith can only be caught.

MISS MARGARET A. COLE: Does the lecturer advocate that there should be more classes for retarded children in the primary and secondary schools, classes of smaller numbers where the special interests of the children could be fully developed?

THE LECTURER: Yes. Illiteracy is one of the serious things that we find among the delinquents in court. I always get into most awful hot water from teachers when I say how puzzled I am that the Army can teach an illiterate to read in six months, and our primary and secondary schools cannot teach them in ten years. There is something wrong somewhere; it is probably the size of the classes, for these children do require very special individual tuition, and they are not getting it as much as we should like them to have it to-day.

THE CHAIRMAN: I am quite sure that from the way you have received both his speech and his replies to questions you would wish me to convey to Sir Basil Henriques a very hearty vote of thanks from all of us.

I agree with almost every word he has spoken, at any rate in his speech, but perhaps in some of the answers to questions I might have put in a caveat. I think that the only word in his speech that I should have liked to quarrel with was that he persistently spoke of the Children's Officers as 'she', and never changed the gender. I hope very much that we shall take to heart what he has said, and I would be very thankful if it were the starting point of a real movement for better organization with a view to better co-operation in this all-important subject.

The vote of thanks to the Lecturer was carried with acclamation.

THE LECTURER: I would remind Miss Fry that I never spoke of a 'she' delinquent!

MR. P. A. LE NEVE FOSTER: Before the meeting ends, I am sure that you all agree that we ought to give a vote of thanks to Miss Fry for presiding over us this afternoon. As the great-grandson of the man in whose honour this lecture has been given, it falls to me to say thank you on behalf of us all.

A vote of thanks to the Chairman was carried with acclamation, and the meeting then ended.

G E N E R A L N O T E S

IMPERIAL INSTITUTE

The Annual Report of the Imperial Institute for 1954 gives evidence of the Institute's expanding work. There was an increase of 43,000 over the previous year in the number of people visiting the Institute, and an increase in the grants from the United Kingdom Government, and from Commonwealth Governments, made possible a considerable expansion of the Institute's educational services.

It is stressed that the Institute is a body concerned with the teaching of contemporary developments of many countries, rather than a museum. The aim is to enable the teacher or student to see all the essential facts and characteristics of a country.

COMMONWEALTH ARTISTS' EXHIBITION

The third annual exhibition of works by artists from the Commonwealth is being held at present at the Art Gallery, Imperial Institute, South Kensington. The exhibition is open from 10 a.m. to 4.30 p.m. on weekdays, and from 2.30 to 6 p.m. on Sundays; admission is free.

EXHIBITION OF BINDINGS

The newly formed Guild of Contemporary Bookbinders is at present holding an exhibition of work by its members. This provides a rare opportunity to see the best of the work produced by individual creative bookbinders at the present time. The exhibition is at Foyles Art Gallery, Charing Cross Road, London, W.C.2, and is open until 4th June; admission is free.

MAYORAL JEWEL COMPETITION

The Corporation of Bolton have authorized the Worshipful Company of Goldsmiths to announce an open competition for the design of a Mayoral Jewel for evening wear. The jewel is to be acquired by the Corporation to give effect to a public benefaction by Mr. J. W. Wigglesworth of Bolton. Details may be obtained from the Clerk of the Worshipful Company of Goldsmiths, Goldsmiths Hall, Foster Lane, London, E.C.4.

DISCOVERY OF A WALL PAINTING

During research work by the staff of the Historic Buildings Section of the L.C.C.'s Architects Department, a wall painting was discovered at Brooke House, Hackney, which was in the process of being demolished. The painting, which dates from the late fifteenth or early sixteenth century, was overlaid with white-wash. It is being removed and preserved, but cannot be viewed by the public at the Brooke House site.

THE HALSINGBORG EXHIBITION, 1955

The British exhibit at the Halsingborg exhibition, which takes place from 10th June to 28th August, has been organized by the Council of Industrial Design. It is a four-room family flat, and will be on show in the International Hall with flats from nine other countries. The flat is designed for a family of three; it is an example of current architectural practice in Britain, and is furnished with goods in current production. The costs of staging the exhibit have been met by private subscription, the Royal Society of Arts being one of the guarantors.

27TH MAY 1955

GENERAL NOTES

CANADIAN STUDY VISIT, 1955

The Commonwealth Council is organizing, with the support of the Commonwealth Relations Office, Canada House, and the Federation of British Industries, a study visit to Canada in the autumn. It is especially hoped that younger persons, such as advanced university students and young business executives will participate. The tour will cover a very wide range of subjects illustrative of Canadian development, the estimated total cost per person being something under £400. Contributions to the guarantee fund are invited from interested firms and organizations. Nominations of applicants should be made as soon as possible. Particulars may be obtained from: The Organizer, Canadian Study Visit, Conservative Commonwealth Council, Abbey House, Victoria Street, London, S.W.1.

OBITUARY

PROFESSOR W. BURRIDGE

We record with regret the death, at Dartford, Kent, of Professor W. BurrIDGE, D.M., M.A. Born in 1885, in Devon, Professor BurrIDGE was educated at Christ Church, Oxford. After serving as a Captain in the R.A.M.C. in the First World War, he went to India, where he was Professor of Physiology, and Principal of King George's Medical College, and Dean of the Faculty of Medicine, at Lucknow University. He made a number of discoveries, his experiments being brilliantly original, and using simple apparatus.

Professor BurrIDGE was elected a Fellow of the Society in 1934.

CORRESPONDENCE

BUSINESS AS PATRON OF THE ARTS

From MR. F. E. HANSFORD (CHAIRMAN OF EXECUTIVE COMMITTEE, FULHAM HISTORY SOCIETY), 22 RANELAGH AVENUE, S.W.6.

'The business man who inherits the social obligation of patronage [of the arts] may perhaps be remembered by posterity with gratitude.' This sentence from Mr. F. C. Hooper's recent lecture (reported in the last issue of the *Journal*) reminds one that last month witnessed the unveiling of a plaque placed on 'The Little Georgian House' (318 Euston Road, N.W.1) by the St. Pancras Borough Council, to commemorate the residence there of John Braithwaite (1797-1870), the celebrated railway engineer and inventor, who was for over fifty years a member of the Society of Arts.

Business, indeed, appeared as 'patron of the arts' in the present case, for it is due to the interest and foresight of Mr. Alan J. Rayment, Chairman of The Car Mart Limited, that this little gem of Georgian architecture has been preserved for the delight of posterity. Professor A. E. Richardson, P.R.A.—himself a distinguished member of Council of the Royal Society of Arts—who performed the unveiling ceremony on 14th April, congratulated Mr. Rayment and the Directors on their public-spirited action in preserving the house, and praised the work of restoration which had been so carefully and artistically done. It was here, remarked Professor Richardson, that John Braithwaite lived in an eighteenth century residence almost out of town; immediately northwards stretched the St. Pancras countryside towards the hills of Hampstead and Highgate, with Hendon beyond. Braithwaite stayed to see the laying-out of Regent's Park and the passing of Shillibeer's bus—the first to run in London's streets—by his doorstep along the New Road (Euston Road). St. Pancras, continued the speaker, contained not a few notable survivals of yesterday in brick and stone, and he greatly hoped that their continued existence might be secured, as in the case of the Little Georgian House, for many years to come.

That the preservation of 'No. 4 Bath Place' (as the house was originally known) will be 'remembered by posterity with gratitude' I have not the slightest doubt.

SHORT NOTES ON BOOKS

PEN AND INK DRAWING. *By Acanthus—Frank Hoar. Studio, 1955. 15s*

The author of this further addition to the 'How To Do It' series is convinced of the importance to the student of an appreciation of the great pen drawing of the past. Some fine plates of such works by the great masters are included, with brief background notes, illustrating these methods. There are also examples of work of well-known artists of to-day.

THE MATHEMATICAL PRACTITIONERS OF TUDOR AND STUART ENGLAND. *By E. G. R. Taylor. Cambridge University Press, 1954. 55s*

This book gives an account of those mathematical practitioners—the teachers, text-book writers, instrument makers, navigators, land surveyors and map makers—who, during the period 1485–1714, in part answered the demand for instruction created by the need for improved techniques in navigation and kindred sciences. It was their work which provided the basis from which advance became possible. The book contains a foreword by the Astronomer Royal, and biographies of some four hundred practitioners. There is also a list of works on the mathematical arts and practices.

REMBRANDT. *Edited by Anthony Bertram. Studio, 1955. 3s*

This addition to the 'World's Masters New Series', contains 47 plates and a short foreword. There are notes on certain of the illustrations, and biographical notes.

FROM THE JOURNAL OF 1855

VOLUME III. 25th May, 1855

From a letter on Public Works for India, by A. Cotton.

Sir,—The time of the meeting of the Society on the 7th instant was unfortunately so much taken up by gentlemen speaking on matters that did not at all affect the great question under consideration, and by the same gentlemen who on the previous evening occupied so much time in discourses on the advantages of high-speed railway, which nobody denied, that only one or two of the gentlemen who wished to speak on the real question had an opportunity of doing so. I had also reckoned upon an opportunity of making some further remarks on the main points I had brought forward, but, in consequence of the turn matters had taken, it seemed to me that there was no alternative, at so late an hour, but for me to make merely such remarks as were required to show the entire ignorance of the whole subject of Indian civil engineering which the speeches of my opponents displayed.

I beg now, therefore, to add a few things which I could have wished to have said at the meeting.

Some Activities of Other Societies and Organizations

MEETINGS

WED. 1 JUNE. Italian Institute, 39 Belgrave Square, S.W.1. 6.30 p.m. Dr. Daniel P. Waley: *Oratio*.

THURS. 2 JUNE. Chemical Society, Burlington House, Piccadilly, W.1. 7.30 p.m. Prof. H. C. Brown: *Chemical Effects of Steric Strains*.

MON. 6 JUNE. Geographical Society, Royal, South Kensington, S.W.7. 8.30 p.m. G. Hattersley-Smith: *Ellesmere Land*.

THURS. 9 JUNE. Anthropological Institute, Royal, 21 Bedford Square, W.C.1. 5.30 p.m. Prof. Dr. E. Freiherr von Eickstedt: *Palaeo-psychology and the Spanish Rock Paintings*.

OTHER ACTIVITIES

NOW UNTIL 4 JUNE. The Embroiderers' Guild, at the Royal Water-Colour Society Galleries, 26 Conduit Street, Bond Street, W.1. *Exhibition of Embroidery*.

NOW UNTIL 9 JUNE. Imperial Institute, South Kensington, S.W.7. *Exhibition of work of Commonwealth Artists*.

